Name: _____

at1124exam: Radicals and Squares (v827)

Question 1

Simplify the radical expressions.

$$\sqrt{18} \qquad\qquad \sqrt{20} \qquad\qquad \sqrt{75}$$

$$\sqrt{3 \cdot 3 \cdot 2} \qquad\qquad \sqrt{2 \cdot 2 \cdot 5} \qquad\qquad \sqrt{5 \cdot 5 \cdot 3}$$

$$3\sqrt{2} \qquad\qquad 2\sqrt{5} \qquad\qquad 5\sqrt{3}$$

Question 2

Find all solutions to the equation below:

$$\frac{(x+6)^2 - 6}{5} = 15$$

First, multiply both sides by 5.
$$(x+6)^2 - 6 = 75$$
Then, add 6 to both sides.
$$(x+6)^2 = 81$$
Undo the squaring. Remember the plus-minus symbol.
$$x + 6 = \pm 9$$
Subtract 6 from both sides.
$$x = -6 \pm 9$$
So the two solutions are $x = 3$ and $x = -15$.

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Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 6x \ = \ 91$$

$$x^2 + 6x + 9 = 91 + 9$$
$$x^2 + 6x + 9 = 100$$
$$(x+3)^2 = 100$$
$$x + 3 = \pm 10$$
$$x = -3 \pm 10$$
$$x = 7 \qquad \text{or} \qquad x = -13$$

Question 4

A quadratic polynomial function is shown below in standard form.

$$y \ = \ 2x^2 + 12x + 13$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 2 .
$$y = 2(x^2 + 6x) + 13$$

We want a perfect square. Halve 6 and square the result to get 9 . Add and subtract that value inside the parentheses.
$$y = 2(x^2 + 6x + 9 - 9) + 13$$

Factor the perfect-square trinomial.
$$y = 2((x+3)^2 - 9) + 13$$

Distribute the 2.
$$y = 2(x+3)^2 - 18 + 13$$

Combine the constants to get **vertex form**:

$$y = 2(x+3)^2 - 5$$

The vertex is at point $(-3, -5)$.